Amendments to the Specification

Please replace paragraph 21 in the specification with the following amended paragraph 21.

[0021] A flow chart of an embodiment of the method of this invention is shown in Figure 1. Referring to Figure 1, image characteristics 20 for a mail piece being examined are obtained (step 30, Figure 1) from an Image reading and Processing Center (2, Fig. 3; in one embodiment, a Remote Computer Reader- RCR). The RCR (Remote Computer Reader) 2 is a key site-centralized system that processes letter mail images for the purpose of address resolution - reading address text and deriving delivery point postal (ZIP) codes. (As a central processing point for all images lifted by mail transport and scanning systems, such as AFCS, MLOCR, and DIOSS transports, RCR is a logical central source for archiving letter mail images, enabling their later retrieval for investigative purposes. (8, Fig. 3)) A threat profile 40 is then retrieved from a profiling configuration file or database (step 45, Figure 1). In one embodiment, the threat profiles 40 are maintained in a Profiling Configuration File (5, Fig. 3) stored in the RCR system 2. The Profiling Configuration File (5, Fig. 3) can be created at and downloaded from an Image Inspection System Server (17, Fig. 3) through a network (12, Fig. 3). (The term "image characteristics," as used herein below refers to one or more image characteristics.) The threat profile 40 is then compared to the image characteristics 20 (step 50, Figure 1) in order to determine whether the image characteristics match the threat profile (step 60, Figure 1). If the threat profile 40 matches the image characteristics 20, the mail piece is identified for special processing (step 80, Fig. 1). ("Matching a threat profile" as used herein below can include taking account the severity of the profile. Thus, in some embodiments the image characteristics are compared to one or more profiles.) If the threat profile 40 does not match the image characteristics 20, another threat profile is then retrieved and compared to the image characteristics. If all of the threat profiles 40 do not match the image characteristics 20 (step 65, Figure 1), normal mail processing continues (step 70, Fig. 1 and step 15, Fig. 3).

Please replace paragraph 27 in the specification with the following amended paragraph 27.

[0027] In one embodiment, the remote image reading and processing (RCR) system 2 can perform "Front-end" and "Back-end" image processing (see Figure 3). For "Front-end" processing, the remote image reading and processing system (RCR) 2 receives and analyzes an image while the mail piece is in flight on a mail transport (such as a MLOCR or DIOSS transport) (26, Fig. 3). The result message from the remote image reading and processing system (RCR) 2 is normally used to indicate the destination postal (ZIP) code result achieved by address recognition processing of the remote image reading and processing system (RCR) 2. In this embodiment, this result message may be modified or augmented to indicate that a mail piece fits a "Profile" as described earlier. This special result, which could take the form of a reserved postal (ZIP) code, could be used to sort the "Profiled" mail to special bins for subsequent special handling or manual inspection (3, Figure 3). This approach is practical only for very accurate high-resolution profiles, such as detection of a letter from a specific return address. The approach is impractical for profiles based on characteristics that are coarse or subject to inaccuracies, as the volume of mail out-sorted for special handling may be too high. For profiles based on characteristics that are coarse or subject to inaccuracies, a preferred alternative involves routing the "Profiled" mail piece to "Back-end" processing at the remote image reading and processing system (RCR) 2, as discussed below.

Please replace paragraph 28 in the specification with the following amended paragraph 28.

[0028] In this embodiment, the "Back-end" processing at the remote image reading and processing system (RCR) 2 occurs while mail is in trays waiting for the next (in one embodiment, RBCS) processing step (28, Fig. 3). Normally, the result from "Back-end" processing is used to determine whether video coding of an image must occur to determine the destination result address. The video coding occurs at remote (REC) sites. As in the case of "Front-end" processing, the result record obtained from the remote image reading and processing system (RCR) may be modified to indicate that a mail piece fits a "Profile". For "Back-end" processing at the remote image reading and processing system (RCR), two scenarios for handling "Profiled" mail pieces may be implemented. Mail pieces fitting very accurate high-resolution profiles (again, the example of detecting a specific

return address) could be flagged immediately as requiring manual inspection or neutralization. The mail pieces matching very accurate high-resolution profiles may be identified, through barcodes or other means, so that the mail pieces can be out-sorted for inspection (or neutralization) on its next transport pass (for example, on an OSS or DIOSS transport).

Please replace paragraph 29 in the specification with the following amended paragraph 29.

[0029] For coarse profiles (e.g., mail pieces without a return address) (34, Fig. 3), indication of a profile match at the remote image reading and processing system (RCR) 2 may cause the image to go to a remote (REC) site for manual image inspection (4, Figure 3). Specifically, a special "Security Desk" at another remote (REC) site 4 could be created to screen images flagged by the remote image reading and processing system (RCR) 2 as fitting a profile. The specially trained individual screening the profiled images would have access to up-to-the minute investigative information allowing the image to be further classified as innocuous or suspicious enough to warrant physical inspection or neutralization of the mail piece. Images classified as innocuous would require no further address keying if the remote image reading and processing system (RCR) 2 had resolved the destination address.

Please replace paragraph 39 in the specification with the following amended paragraph 39.

[0039] Several characteristics, but not limited to these, relevant to classifying a mail piece as threat-consistent from analysis of mail piece images are described below in terms of the differing degrees of effectiveness, accuracy, image type, and processing power required.

1) Barcodes (90, Fig. 5) and identifying marks (85, Fig. 5) (in one embodiment, FIM, POSTNET & PLANET). The remote image reading and processing system (RCR) 2 currently detects the presence of the four different facing identification mark 85 (FIM) types. This function is very accurate on most images, unless the mark (FIM) is obscured by stamps or cancellation marks. The barcodes 90 (POSTNET and PLANET) are effectively and accurately detected and decoded at the remote image reading and processing system (RCR) 2. The identifying marks 85 (FIM) and barcode 90 reading

capabilities enable definition of mail profile characteristics (24, Fig. 3) based not only on presence or absence of these barcode types, but also on exact matches against specific values.

2) Destination Address Style. In one embodiment, the remote image reading and processing system (RCR) 2 detects multiple candidate address blocks (groupings of text that appear to have the form of a multi-line text address) on each letter image, and classifies each block as to the probability that it is a return or destination address. A byproduct of the optical character recognition (OCR) process on an address block is a coarse characterization of print style:

- Machine Printed Styles – Sub-styles for Machine Print are Machine solid, Machine broken, and Machine dot-matrix.
- Handwritten Styles - Sub-styles for handwritten are hand-printed and cursive. The categorization of sub-styles is more accurate for machine print addresses than for handwritten addresses.
- Skew - A coarse indication that pronounced skew of address text (where skew refers to a pronounced deviation from horizontal, i.e., from parallelism to the envelope bottom edge) exists may be obtained.

3) Destination Address Resolution. In one embodiment, the remote image reading and processing system (RCR) resolves the mail piece destination address from the envelope image, determining the finest-depth 11-digit postal (ZIP) code that corresponds to the address text. The remote image reading and processing system 2 (RCR) address resolution is performed in conjunction with address directory files created from previously obtained source data and refreshed weekly at each the remote image reading and processing system 2 (RCR) site, so the remote image reading and processing system 2 (RCR) address information is always up to date. A mail piece characteristic indicating that the destination address postal (ZIP) code resolved by the remote image reading and processing system (RCR) 2 matched any from a list of target postal codes (ZIPs) can be immediately provided. The matching process may support a wild card character (*) allowing a truncated comparison (e.g., for a 5-digit ZIP match).

4) Return Address Style. The classification of return address style at the remote image reading and processing system 2 (RCR) is similar to that described for destination address resolution.

5) Return Address Resolution. Return address resolution (including handwritten return address resolution) may support the following mail piece characteristics:

- Postal Code (ZIP) Match - against a list of postal codes (ZIP) (22, Fig. 3) in a configuration file, with wild-card support, allowing truncated comparison (e.g., for a 5-digit ZIP match).
- Invalid Return Address - indicating whether a match can be found in a postal code (ZIP+4) address database. The text return address block (as two separate characteristics). This indication is coarse, as false indications of an invalid address may be asserted due to incorrect OCR results.
- Invalid Delivery Point - indicating that while the text return address is consistent with the postal code (ZIP+4) address data, no match can be found in a more detailed address database. The data in the more detailed address database specifically identifies individual delivery points (e.g., each house on a street) rather than just a range of addresses as is contained in the postal code (ZIP+4) data. A randomly chosen house number for a valid street has a reasonable probability of being detected by this comparison.
- Non-local Return Address - Two embodiments of methods for providing a reliable indication as to whether the return address is not local (that is, is inconsistent with the collection point) are described below. These methods may be implemented at the remote image reading and processing system (RCR). A return address anomaly, such as a mail piece with a New Jersey return address that was evidently inserted into the mail stream in Florida, could be identified by one of the methods discussed below.
  - In one embodiment the consistency between the return address and the location of the mail processing transport that first processed the mail piece is examined. For each mail piece, the remote image reading and processing system (RCR) receives ID Tag information containing an identification number (ISS #, a number that uniquely

identifies a specific MLOCR, DIOSS, or AFCS transport, throughout the nation) of the transport that first processed the mail piece. At the remote image reading and processing system (RCR) 2, the ID TAG ISS# is compared to a static table associating identification numbers (ISS#s) to the Sectional Center Facilities (identified, in one embodiment, by the first three digits of a postal (ZIP) code) served by the transports.

- In a second embodiment, the consistency between the Return Address and the postmark on the mail piece is examined. The ID TAG comparison described above in the first embodiment utilizes existing information. Obtaining the information contained in the image of postmark on the mail piece requires additional image processing.

6) Envelope Size & Skew.

- Envelope Size - At the remote image reading and processing system (RCR) 2, a "cropping" function detects the height of the mail piece in the image and excludes any overscan areas. Envelope length is detected directly by the number of scan lines contained in the image (nominally 212 scan lines per inch). In this embodiment, the envelope dimensions are used to characterize the envelope size (e.g., business envelope, personal envelope) or to support specific tests for envelope height and width. The camera scan height (approximately 4.5" for presently utilized cameras) limits the maximum range of envelope height detection.
- Envelope Skew - Envelopes containing powder or other bulky contents may have a tendency to skew on the mail processing transports. In one embodiment, the skew is detected utilizing the bi-tonal image of the mail piece. In another embodiment, grayscale image processing may be used to detect envelope skew.

7) Postage characteristics. The following embodiments, but not limited to, can be used to identify postage characteristics:

- Postage Type - A postage type classifier, based on neural net technology, may be integrated into the remote image reading and processing system (RCR) to distinguish the following postage types:
  - Stamp

- Metered
- Pre-printed
- Embossed

Effectiveness and accuracy may initially be limited to a coarse classification, with moderate accuracy, since the mail pieces whose images are captured on present mail processing transports have cancellation markings over the postage. Use of grayscale images would allow higher accuracy of classification.

- Excessive Postage - The following embodiments, but not limited to, can distinguish instances of probable excessive postage. An assessment of the extent and shape of the postage area may be obtained from image processing of the binary (bi-tonal) images. Combined with the neural net technology described above for determining Postage Type, this method could assess the probability of presence of multiple stamps. The result is a probabilistic indication of excessive postage.

A more precise determination of the postage amount on an envelope requires processing grayscale images in order to recognize in detail specific stamp images and their amounts.

8) Restrictive Markings - The possible presence of restrictive text such as the words "Personal" or "Confidential" may be detected by means of image character recognition. In some embodiments, the image processing could be performed at the remote image reading and processing system (RCR) 2. For handwritten marks, the detection would require handwriting analysis and may be more appropriately performed offline. For machine printed mail, optical character recognition results, usually obtained at the remote image reading and processing system (RCR) 2, enable searching machine printed text for keywords (32, Fig. 3).

9) Clear Zone Infringements - Several embodiments, but not limited to, of methods for detecting Clear Zone Infringements are disclosed below. Referring to Figures 2 and [[5]] 4, the bottom band of envelope images seen by the remote image reading and processing system (RCR) 2 is normally clear, as this is the area in which a (POSTNET) barcode 90 is printed after the remote image reading and

processing (and video coding if applicable) is completed. Different infringements to the clear area could be detected in both binary and gray images by the methods described herein below.

- Destination Address Infringement - Referring to Fig. 2, the letter 10 exhibits a handwritten address block that infringes on the clear zone at the bottom of the envelope and on the barcode 90. The coordinates of a bounding box for each candidate address block found in the image are obtained by image processing. Infringement of the address block on the clear zone can also be detected by image analysis.
- Stain. Stains from settling of chemical compounds may be visible as noise in the bi-tonal image of the front of the envelope used for optical character recognition (OCR) processing. The image of the mail item, and in particular the bottom of the image (bottom of the envelope), may be analyzed by means of image processing techniques in order to classify the area as "Not Clear", possibly indicative of a stain. More definitive analysis may be performed on gray images. In one embodiment, the analysis may be performed at the remote image reading and processing system (RCR) 2.

Handwriting Matching - Handwriting analysis may be utilized to compare handwriting on images of mail to one or more reference images of evidence documents. The result of this comparison can produce a similarity score that could be thresholded to identify mail pieces that may have been penned by the author of the evidence mail piece.

Table 2: Image-Detectable Mail Piece Characteristics

Characteristic	**Categories**	**Image Type**	**Detection Rate**	**Accuracy**

Characteristic	Categories	Image Type	Detection Rate	Accuracy
1) **FIM, POSTNET, & PLANET Barcodes**	• FIM presence & type • Barcode type • Barcode field match (against list)	Bi-Tonal	High	High
2) **Destination-Address Style**	• Handwritten (any form)	Bi-Tonal	Moderate	Moderate
	• Hand printed • Hand cursive	Bi-Tonal	Moderate	Moderate
	• Machine printed (any form)	Bi-Tonal	Moderate	Moderate
	• Machine solid • Machine broken • Machine dot-matrix	Bi-Tonal	Moderate	Moderate
3) **Destination Address Resolution**	• Zip Match (against a list of ZIPS)	Bi-Tonal	High	High
	• Mis-spelled words (MP)	Bi-Tonal	Low	Moderate
4) **Return-Address Style**	• Not present	Bi-Tonal	Moderate	Moderate
	• Handwritten (any form)	Bi-Tonal	Moderate	Moderate

Characteristic	Categories	Image Type	Detection Rate	Accuracy
	• Hand printed • Hand cursive	Bi-Tonal	Moderate	Moderate
	• Machine printed (any form)	Bi-Tonal	Moderate	Moderate
	• Machine solid • Machine broken • Machine dot-matrix	Bi-Tonal	Moderate	Moderate
5) Return Address Resolution	• Invalid address (ZIP+4 Directory)	Bi-Tonal	Moderate	Moderate
	• Invalid address (DPF Directory)	Bi-Tonal	High	High
	• Non-local return address	Bi-Tonal	Low (HW) Moderate (MP)	Moderate (HW) High (MP)
		Bi-Tonal	High	High
	• Postal Code (Zip) Match (against a list of ZIPS)	Bi-Tonal	Low (HW)-5 digits Moderate (MP)to High - 11 digits	High
6) Envelope Size & Skew	• Envelope Length • Envelope Height	Bi-Tonal	High	High

Characteristic	Categories	Image Type	Detection Rate	Accuracy
	• Envelope Skew	Bi-Tonal	Moderate	Moderate
7) **Postage Characteristics**	• Postage Type (Stamp, Metered, Pre-printed, Embossed)	Gray	Moderate	Moderate
	• Excessive Postage	Bi-Tonal	Moderate	Moderate
		Gray	High	High
8) Restrictive Markings	Configurable list of keywords ("Personal", "Confidential", etc.)	Bi-Tonal	Low (HW) Moderate (MP)	Moderate (HW) High (MP)
9) Clear Area Infringement	• Destination Address Infringement	Gray	Moderate	Low
	• Stain	Bi-Tonal	Low	Low
		Gray	Moderate	Moderate
10) Handwriting Matching	Similarity score (degree of similarity to image of evidence mail)			

Table Legend:

Image Type: Type of image required to support detection of the image characteristic:

Bi-tonal:	Current bi-tonal images of the front of the envelope are usable
Gray:	Grayscale images required
Color:	Color images required

Detection Rate: An estimate of the frequency of false negatives - instances where a mail piece exhibits the characteristic but the system fails to detect and indicate it:

Low	UP to 25% false negatives
Moderate	Up to 15% false negatives
High	Up to 5% false negatives
Very High	Approximately 1% - 2% false negatives

Accuracy: An estimate of the frequency of false positives -- instances where the system incorrectly indicates that the characteristic is exhibited by the mail piece

Low:	Up to 25% false positives
Moderate:	Up to 5% false positives
High:	Approximately 1% - 2% false positives

Please replace paragraph 44 in the specification with the following amended paragraph 44.

[0044] Figure 5 indicates an embodiment in which the Handwriting Matching software is utilized to pre-process samples of a person's handwriting to extract distinguishing characteristics, then is utilized to identify other mail pieces penned by the same individual. Referring to Figure 5, a handwriting sample 300 from one individual is processed by means of a handwriting profiling method 310 and the distinguishing handwriting characteristics for that individual 320 are included in the profile. A hand addressed mail piece is imaged and the image 305 and the handwriting characteristics are obtained for that image 315. The handwriting characteristics are obtained for that image 315 are compared to the distinguishing handwriting characteristics for that individual 320 and

mail piece is identified for special processing 350, if the distinguishing handwriting characteristics for that individual [[320]] 330 substantially match 340 the handwriting characteristics are obtained for that image 315.